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REMARKS

The Office Action of July 12, 2005 has been carefully considered.

Claims 1-11 have been rejected under 35 USC 112, 2nd paragraph, as omitting the essential step of adding a header after segmentation of the bit stream.

Claim 1 has now been replaced by new claim 17, which does not recite a header, and therefore, no essential steps have been omitted. Withdrawal of this rejection is requested.

Claims 1, 3, 4, 7, 9 and 20 have been rejected under 35 USC 102(e) over Ravikanth, and claims 12 and 14-16 have been rejected under 35 USC 103(a) over Ravikanth.

The invention relates to a method for packet processing for data transmission over an optical fiber. The method includes forming a novel form of packets which can be treated as if they were conventional packets for purposes of encapsulation, routing, and transmission on a communications network (page 6, lines 4-7). The heart of the invention lies in the formation of these novel packets, each of which includes a segment of a bit stream in its original protocol. This segmentation is done to optimize utilization of the available bandwidth of the optical fiber, as now recited in claims 17 and 19.

Thus, the invention is directed to a method for packet processing for data transmission over an optical fiber, the method including the steps of 1) receiving an incoming bit stream of data of at least one service, 2) segmenting the bit stream in its original protocol into variable length segments according to available transmission bandwidth, 3) adding a tag identifying a route between a source and a destination end-point of the bit stream, and 4) processing each such segment for transmission in a transmission frame. Once the packets are

formed, they can be treated by conventional methods, e.g., encapsulating the tagged segment into a Point-to-Point Protocol (PPP) packet in a frame, and mapping the encapsulated packet into a transmission frame for transmission over an optical fiber. (See, for example, page 3, lines 20-25 of the application.) Support for the amended claims can be found on page 3, lines 20-22, page 6, lines 10-16, page 7, lines 17-22, page 8, lines 1-7, and page 8, lines 23-24 of the specification.

Conventional packets are known only for certain data services, particularly Ethernet and Fibre channel packets. Other services are divided in different fashions, for example, TDM services are divided into time slots, and ATM services are divided into cells. As stated in the Background of the Invention (page 1, lines 16-19), at present, data according to each protocol must be transmitted via its own network, and data at different bit rates must be transmitted separately or processed before being transmitted simultaneously with other data rates and/or types over a higher bit rate medium. Thus, in conventional methods, utilization of bandwidth during transmission of various services over a common optical fiber system is inefficient, as not all the bandwidth is utilized due to empty portions of packets, time slots, and/or cells, etc. The invention, by creating novel packets, permits services, in their original protocols, to be divided up into different size units, so that "empty" spaces on the bandwidth can be filled, thereby increasing efficiency of the overall system. This method permits the data received in a variety of different protocols from a variety of different services to be combined into packets without regard to their original protocols. In addition, (except for TDM services, which require synchronization), even single services can be

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segmented into smaller units for more efficient utilization of network resources than is possible at present.

The Office Action alleges that Ravikanth discloses a method for data transmission comprising adding a label to the front of a datagram, where adding a label is interpreted as adding a tag, and where the datagram is interpreted as a segment. The presence of a datagram has also been interpreted as being preceded by a form of segmentation of a data stream.

The patent to Ravikanth utilizes datagrams which are pre-formed conventional packets, and can only be utilized with IP packets (packet-based services). The presence of a datagram does not teach or suggest receiving an incoming bit stream of data of at least one service, segmenting the bit stream in its original protocol into variable length segments, and adding an identifying tag, before processing the segment for transmission, as is claimed. Rather, the packet based services which are provided as datagrams in Ravikanth can be *subsequently* segmented according to the present invention and formed into the novel packets of the invention, alone or with packets of other types of services.

In the Office Action, on page 9 it is stated that "Ravikanth does teach the segmentation of bit streams as indicated above" (3-4 lines from the bottom). The Office Action has **interpreted** the presence of a datagram as being preceded by a form of segmentation of a bit stream. Ravikanth does NOT teach segmentation of bit streams (i.e., into packets); the reference only teaches treatment of pre-formed packets in the form in which they arrive. The invention, to the contrary, teaches segmenting bit streams into a novel type of packet *based on optimization of bandwidth*, which can then be treated like a conventional packet.

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Ravikanth teaches how to map IP service packets over Ethernet onto SDH (transmission frames) by adding a label at the start and, since the packets are of variable length, a label at the end. But Ravikanth can only use complete packets as received and does not segment the packets for any reason. According to the claimed invention, the bit stream (or streams) is cut into segments of a selected size and tags are added to permit optimization of available bandwidth for more efficient transmission (and to combine multiple services, when desired).

In the example discussed in the Office Action, it appears that the bit stream has not been segmented, but rather the frame was used as is. In this example, the selected segment happens to be the same size as an Ethernet packet. In other words, in some cases, the full frame can be taken as the segment and "packetized", and in this regard, the frame can be "equal" to a packet. Nevertheless, the segment is processed by the claimed operations, which still differ from those of Ravikanth. However, those skilled in the art will appreciate that ALL Ethernet packets (as a service) are the same in ALL applications, while the segment according to the invention can be any selected portion of a conventional Ethernet packet or other service bit stream.

The Office Action further states that "it is also clear that" the incoming traffic has a format determined in advance. This is not clear at all; it may occur in a particular example, but the next Ethernet frame received could just as easily be segmented into smaller segments, and not remain as a whole frame.

The Office Action alleges that it would have been impossible to recognize which service the bit streams belong to without a previously established format, so that the

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segmentation can be according to the type of service. It is then noted that the claimed segmenting of the bit stream is equivalent to recognizing the different services, and concludes that bit streams are pre-formed prior to tagging in the same manner of the datagram of Ravikanth. This is not correct. It may true that each service has an established format by which it can be recognized, but recognizing which data service is arriving has no relationship to utilizing datagrams or to making novel packets of variable bandwidth. In any event, "datagrams" are only relevant for Ethernet services, and not for TDM over SDH services or for Storage, or other types of services.

Regarding the allegation that Ravikanth teaches encapsulation of datagrams of different lengths (figure 3), and that MPLS of different length packets is clearly for different data services, this is also incorrect. To state that Ravikanth "provides for different services regardless of the payload protocol type" indicates a misinterpretation of the reference, since while the payload being carried in Ravikanth can be "any network layer protocol," the protocols involved are *only for IP service*. The fact that Ravikanth doesn't look inside the payload, not only does NOT inherently provide for different services, but is only possible because he can process only a single service. Ravikanth thus takes pre-formed IP service packets and adds an MPLS label for label switching over serial links. Ravikanth's datagrams may, indeed, be of variable length, but they are received that way and transmitted that way, without regard to utilization of bandwidth.

The invention takes bit streams of one or more services and segments them to form a new unit which can then be manipulated as if it were a conventional packet, even though

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it is not. In this way, units of different sizes can be combined to optimally fill the available bandwidth. This is the only way to multiplex different services in one bit stream.

With regard to the apparatus claims, the Office Action alleges that it would be obvious to provide an engine having modules to carry out the method of Ravikanth. The method of Ravikanth has been described above, and an engine provided to carry out the method of Ravikanth would not include the crucial service port and segmentation module of the invention for receiving and segmenting an incoming bit stream of data of at least one service in its original protocol.

The Office Action points to the non-limiting Example in the application which utilizes an Ethernet frame as a "segment" for purposes of creating a packet, and alleges that the "[E]thernet frames are received as a segment with the identifying information." Applicants submit that this is not accurate. The Ethernet frame is received and may be used, in its entirety, as a segment for purposes of the present method. However, as stated on page 6, lines 15-16, for services such as Ethernet, the segments can have variable length within the particular service, so the frame can be cut into several segments as required to optimize bandwidth. There is no indication in the present application that the format must be determined in advance, as is, indeed, the case in Ravikanth. Rather, the length of the segments may be determined at the time of filling the transmission frames so as to fill, as completely as possible, the bandwidth in each frame.

Withdrawal of these rejections is requested.

Claims 2, 5, 6, 11 and 13 have been rejected under 35 U.S.C. 103(a) over Ravikanth in view of Ndousse. The Office Action alleges that Ravikanth fails to disclose the use of

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HDLC frames, which are disclosed by Ndousse.

Both Ravikanth and Ndousse disclose using packets over SONET/SDH. The Ndousse article on PPP Extensions examines the dynamics of IP traffic over SONET/SDH using PPP in HDLC-like framing. There is no teaching or suggestion in Ndousse of the method of forming the novel packets of the invention, and thus the combination of Ravikanth and Ndousse does not result in the novel single or multi-service packets having segments of variable length in their original protocols of the present invention, but only previously prepared, conventional single service packets.

Withdrawal of this rejection is requested.

In view of the foregoing amendments and remarks, Applicants submit that the present application is now in condition for allowance. An early allowance of the application with amended claims is earnestly solicited.

Respectfully submitted,

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